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7-9-03  
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## SUBSTITUTE SPECIFICATION

### **--AUXILIARY DEVICE FOR EDITING DOCUMENT**

#### **Field of the invention**

The present invention relates to an auxiliary device for editing a document, especially to an auxiliary device connected to a computer peripheral for facilitating the document-editing task. Therefore, a user can directly use the modular key set to edit a document without invoking a key chording (memorize the combination keys) or heavily use a mouse.

#### **Background of the invention**

Computer hardware and software have made rapid progress as the processing speed of computers is growing faster. However, document-editing tools have made insufficient development when compared with the progress of computer hardware and software.

In general, the document-editing task by computer is achieved by typing with a keyboard and with the help of a mouse. The typing and editing of documents require frequent operation of the keyboard and mouse. It is easy for the person typing and editing to develop industrial ailments.

Ergonomic keyboards have been developed to overcome these problems. However, the prior art ergonomic keyboards still require heavy use of the mouse. Moreover, some keyboard manufactures have developed multimedia keyboards, wherein a plurality hot keys (for example: CD, Video, Play, Fast Forward, Fast Rewind, Volume +, Volume-,

Mute, WWW, Email, etc) are incorporated on the standard keyboard and a specific driver is has also been developed for operating this keyboard in Windows environments. When a user presses a specific hot key, the keyboard will send a standard Windows defined extend scan to the system and a specific function is executed. However, the multimedia keyboard (traditional hot key keyboard) still has the following problems:

1. The number of hot keys is limited by keyboard free area or space and twenty hot keys are nearly a maximum.

2. A driver program is required (required to call WINDOWS operating system standard "API WinExec O" function), which occupies system resource and reduces operation speed. The installation of software and compatibility of software are also problems.

3. Almost all the hot key functions are defined by Microsoft and will transfer a standard extend scan code to the Windows OS for launching target applications. But the functions are without the capability to control some functions (Application internal functions) that Windows has not defined (for example: Cut, Paste, copy, New, Open, Save, Reply, Send, Undo, Redo, etc).

At present, the popular Microsoft Office software has provided tools including word, excel, power point etc. Those programs enable a user to finish documents like personal and commercial letters, spread sheet and presentation data. However, in editing the above documents, the user still needs to operate the keyboard, heavily use the mouse or

frequently use key chording to perform certain editing operations. It is still inconvenient for user. For example, to use the “Send” function, the user must memorize the chording keys “ALT+S”, holding the ALT key and then pressing the S key to launch the “Send” function. It is not easy for everyone to remember very many chording key combinations.

### **Summary of the invention**

It is an object of the present invention to provide an auxiliary device for editing a document and to enable a user to directly edit the document on a keyboard. A modular key set is arranged on the computer peripheral and connected to an I/O bus of the single-chip microprocessor. The modular key set is composed of function keys such as cut key, paste key, copy key, mark key, etc. The user uses the mark key to mark a segment of the document, the cut key to cut the document segment in the marked region, and the up arrow, down arrow, left arrow and right arrow to move the cursor to a specific region. Afterward, the user can use the paste key or the copy key to paste or copy the selected document segment to the position of cursor. Therefore, the user can directly use the modular key set to edit the document without invoking key chording or heavy use of the mouse.

It is another object of the present invention to provide an auxiliary device for editing a document, wherein the user can perform a specific function by pressing only one key without invoking key chording or heavy use of the mouse. The moving times and ranges of the user's hand between the keyboard and the mouse can be saved.

It is still another object of the present invention to provide an auxiliary device for editing a document, which does not require any support of a driver program. Therefore, the auxiliary device for editing a document does not have the problem of software compatibility. This is different from the conventional (traditional) hot key, which requires support of a driver program.

It is still another object of the present invention to provide an auxiliary device for editing a document, which is independent of keyboards for various countries. For example, the redo and undo operation can be executed by typing CTRL+Z (hold CTRL key while pressing Z key) and CTRL+Y (hold CTRL key while pressing Y key), respectively. However, the alphabet arrangements on keyboards are different for different countries. For a German keyboard, the positions of “Z key” and “Y key” are opposite to those of an English keyboard. As shown in Figs. 1 and 2, different functions will be executed for these two types of keyboards while pressing the same key combination. Therefore, the chording keys cannot be arbitrarily assigned (not easy to memorize).

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing, in which:

**Brief description of drawing:**

Fig. 1 shows the top view of a German keyboard;

Fig. 2 shows the top view of an English keyboard;

Fig. 3 shows the perspective view of the present invention;

Fig. 4 shows the block diagram of the present invention;

Fig. 5 shows the flowchart of operation of the single-chip microprocessor of the present invention;

Fig. 6 shows the table of key codes for multiple keys corresponding to the individual keys of the present invention;

Fig. 7 shows the perspective view of another preferred embodiment of the present invention; and

Fig. 8 shows the application of the present invention to a Windows keyboard.

### **Description of the invention**

As shown in Figs. 3 and 4, the present invention provides an auxiliary device for editing a document, which comprises a computer peripheral 1 and a modular key set 2 with a document editing function.

In the preferred embodiment of the present invention, the computer peripheral 1 is a keyboard having a single-chip microprocessor 11 in the internal circuit thereof (shown in Fig. 4).

The modular key set 2 is placed beside the arrow keys on the keyboard (shown in Figs. 3) and is connected to the I/O bus of the single-chip microprocessor 11 in the internal circuit of the keyboard. The modular key set 2 is composed of function keys such as cut key 21, paste key 22, copy key 23 and mark key 24.

The user uses the mark key 24 to mark a segment of document, the cut key 21 to cut the document segment in the marked region, and up arrow, down arrow, left arrow and right arrow to move the cursor to a specific region. Afterward, the user can use the paste key 22 or the copy key 23 to paste or copy the selected document segment to the position of the cursor.

When the user presses any key in the modular key set 2, the single-chip microprocessor 11 detects the keystroke of the key in the modular key set 2 and generates a pseudo composite-key (chording or key combinations) code. Fig. 6 shows the relationship between the function keys in the modular key set 2 corresponding to the composite-keys (chording/key combinations). As can be seen from the figure, the composite keys (chording) corresponding to the cut key 21 is CTRL+X, the composite keys (chording) corresponding to the paste key 22 is CTRL+V (pressing one key to imitate that corresponds to holding the CTRL key pressed and pressing the V key, then releasing both keys simultaneously) or ALT+E, P (pressing one key to imitate that corresponds to holding the ALT key pressed and pressing the E key, then releasing both keys simultaneously, and then pressing the P key), the composite keys corresponding to the copy key 23 is CTRL+C, and the composite keys corresponding to the mark key 24 is left Shift or right Shift.

A different computer may have different processing speeds; therefore, the microprocessor 11 may generate the pseudo composite-key code (chording/ key

combinations) with a different compared to the generating speed of an ordinary key (standard key). In the preferred embodiment of the present invention, the separation between the issuing of pseudo composite-key codes (chording/key combinations) corresponding to the function keys in the modular key set 2 is at least 1.5 to 2 ms. Otherwise, a few computers may malfunction.

Fig. 5 shows the flowchart of the microprocessor 11 in the preferred embodiment of the present invention.

After step 30 of powering on the computer, the microprocessor 11 is first in a reset state (step 31) and then begins a security test (step 32). Afterward, if a command is sent to the microprocessor 11 in step 33, the microprocessor 11 executes the command in step 331 and in step 332 the microprocessor 11 judges whether the scan counter time has ended (time out). If the scan counter time has not ended, the microprocessor 11 judges whether the flag time has ended in step 34. If the flag time is has ended, the key code is sent in step 35, else the procedure goes back to step 33.

If the scan counter time has ended, the microprocessor 11 scans each key in step 36 and judges whether a function key has been pressed in step 37.

If no function key was pressed, the procedure goes back to step 33, else the microprocessor 11 judges whether any key in the modular key set 2 was pressed in step 38.

If no key in the modular key set 2 has been pressed, the flag corresponding to that

state is stored in a buffer in step 382 and then the procedure goes back to step 33. If a certain key in the modular key set 2 was pressed, the flag corresponding to that state is set in step 381 and stored in the buffer in step 382.

With reference now to Fig. 7, in another preferred embodiment of the present invention, an extra adding switch key 3 is provided on the left-top corner of the keyboard 1 and the extra adding switch key 3 is connected to the I/O bus of the microprocessor 11. The extra adding switch key 3 is used to switch the mode of the function keys F1-F12 between their ordinary function and an augmentation function. The augmentation functions of the modular key set includes redo, undo, open, new, bold, save, find, forward, send, etc. In other words, the microprocessor 11 has two different key tables (one for standard codes and another for generating chording/key combinations) to switch the function of the function keys F1-F12 between the ordinary function and the augmentation function. The function of the function keys F1-F12 can be expanded while no new keys are necessary.

When the extra adding switch key 3 is pressed, the function keys F1-F12 have the augmentation function as shown in Fig. 6. As can be seen from the table, the composite-key (combination key) code for redo is ALT+E, R; the composite-key (combination key) code for undo is ALT+E, U; the composite-key (chording/combination keys code for open is CTRL+O or ALT+E, O; the composite-key (chording/combination key) code for new is CTRL+N or ALT+F E, N; the composite-key (chording) code for change to bold



form or normal form is CTRL+B; the composite-key (chording/combination key) code for save is CTRL+S or ALT+F, S; the composite-key (chording/combination keys) code for find is CTRL+F or ALT+E, F; the composite-key (combination key) code for forward file is ALT+F, D; and the composite-key (chording) code for send file is ALT+S.

If the extra adding switch key 3 is pressed again, the function keys F1-F12 are switched back to their ordinary functions. The state of the extra adding switch key 3 status can be manifested by adding an additional light-emitting element 5 (shown in Figs.7 and 8).

The code conversion of the composite-key (chording/combination key) code in the present invention can be embodied by sending any specific code (from a device) to code-conversion application software (driver), the code-conversion application software (driver) will transfer the specific code to composite-key (chording/combination key) code information to WINDOWS, it just shares only a minimum WINDOWS resource. Thus enabling or disabling the key code of the function keys F1-F12.

Moreover, in still another embodiment of the present invention, a short-cut key (or launch key) 4 is provided. The short-cut key 4 is connected to the I/O bus of the microprocessor 11. As shown in Fig. 6, the code corresponding to the short-cut key 4 is CTRL+ALT+ specific non-shift key.

When a user presses the short-cut key 4, he can execute any programs without any driver program. For example, the user can open the content of a program on the desktop.

In the short-cut section, the user presses the short-cut key 4 and selects confirm to associate the program with the short-cut key 4. Afterward, the user can directly press the short-cut key 4 to launch the program.

As showing Fig. 8, the present invention can also be applied to a Windows keyboard.

To sum up, the auxiliary device for editing document has following advantages:

(1) The user can directly use the modular key set to edit documents without invoking conventional chording key combinations or heavy use of the mouse.

(2) The modular key set can be operated as a stand-alone device as it does need the support of keyboard driver (code-conversion application software). Therefore, the modular key set does not have the problem of software compatibility.

(3) The user can use the short-cut key to start any function that has been associated with the short-cut key. It is very convenient.

(4) The area of the keyboard does not require enlargement.

(5) The user can directly use the modular key set, just pressing one button for launching application internal functions (for example: New, Open, Save, Cut, Paste, Copy, Mark, Undo, Redo, Forward, Send, Find, Bold).

Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have been suggested in the foregoing

description, and others will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended claims.

For examples, as show in Fig.6, the combination of operations (modular key set), such as pressing, releasing and pressing over again those keys as Shift, CTRL and ALT plus a standard key, is also embraced in the scope of the present invention.--